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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/518,038	12/13/2005	Shoou-I Wang	2443.002US2	3598

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EXAMINER
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GREGORIO, GUINEVER S

ART UNIT	PAPER NUMBER
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4162

MAIL DATE	DELIVERY MODE
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10/03/2008

PAPER

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

<b>Office Action Summary</b>	<b>Application No.</b> 10/518,038	<b>Applicant(s)</b> WANG ET AL.	
	<b>Examiner</b> GUINEVER S. GREGORIO	<b>Art Unit</b> 4162	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 22 September 2008.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1-28 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-28 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All    b) ☐ Some \*    c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)            | 4) <input type="checkbox"/> Interview Summary (PTO-413)           |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)   | Paper No(s)/Mail Date. _____                                      |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date <u>06/07/2005</u> .  | 6) <input type="checkbox"/> Other: _____                          |

**DETAILED ACTION**

***Claim Rejections - 35 USC § 103***

***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

1. Claims 1-18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Prasad et al. (U.S. Publication No. 2002/0155061 A1) in view of Allam et al. (U.S. Publication No. 2002/0103264 A1). Prasad et al. teaches a multistage process by converting methane and other hydrocarbons in a gas feed into hydrogen and carbon monoxide (paragraph 1, lines 1-9). Prasad et al. teaches partial oxidation, steam reforming and water gas shift reaction (paragraph 3, lines 1-7). Prasad et al. teaches a method to produce syngas from hydrocarbon, steam carbon dioxide, and oxygen using multi stage reactors (paragraph 2, lines 1-11; paragraph 7). Furthermore, Prasad et al. teaches partial oxidation prior to the reforming wherein the partial oxidation product is fed into the reforming step which corresponds to the exothermically generated syngas (paragraph 9, lines 1-3). Prasad et al. teaches oxidation reaction is exothermic and reforming reaction is endothermic (paragraph 5, lines 14-15). Prasad et al. teaches the reforming of the methane is thermally balanced through heat generated by oxidation of fuel species because partial oxidation is an exothermic process and reforming is an endothermic process (paragraph 8). Furthermore, Prasad et al. teaches reforming or autothermal reforming reactors as subsequent reactors to the partial oxidation reactor (paragraph 7, lines 6-7). Prasad et al. does not specifically define

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partial oxidation, autothermal reforming or steam reforming. Allam et al. teaches several methods are known in the art to produce synthesis gas from natural gas. Allam et al. teaches partial oxidation of natural gas uses pure oxygen to achieve desired hydrogen to carbon monoxide ratio (paragraph 8). Allam et. al teaches autothermal reaction reforming consists of a partial oxidation burner followed by a catalyst bed with a feed of natural gas, steam and oxygen to produce the required hydrogen: carbon monoxide ratio to produce synthesis gas (paragraph 9). It would have been obvious to one of ordinary skill in the art at the time of the invention to use processes known in the art with the method outlined by Prasad et al. to efficiently produce syngas and fuels from the syngas.

2. Regarding claims 2, 10, 11, 12, and 16-20, Prasad et al. teaches recycling part of syngas stream from the heat-exchange reformer to form part of the feed stream which corresponds to heat exchange-reformed syngas product (paragraph 8, lines 29-30). The heat-exchange syngas stream, which contains carbon dioxide, molecular hydrogen, steam and unreacted hydrocarbons, is combined with reacted syngas product, product formed from the exothermic partial oxidation reaction, prior to heat recovery (paragraph 10, lines 24-30).

3. Regarding claim 3, it is inherent to a process wherein two different streams of gases with two different temperatures combine to form one stream with one temperature and therefore the stream in which temperature can be manipulated such as the diluent steam is an apparent to control the temperature of the combined stream.

4. Regarding claim 4, Prasad et al. teaches using high purity oxygen in a partial oxidation reaction (paragraph 11, lines 21-25).

5. Regarding claim 5, Prasad et al. teaches reacting hydrocarbons with oxygen and steam (paragraph 2, lines 7-10).

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6. Regarding claim 6, Prasad et al. teaches the crude syngas product comprises carbon monoxide, hydrogen, carbon dioxide and moisture which corresponds to the reactive mixture comprises carbon dioxide (paragraph 8, lines 5-6). Furthermore, Prasad et al. teaches water gas shift reaction (paragraph 3, lines 4-5).
7. Regarding claim 7, Prasad et al. teaches solid carbon formation is a common problem experienced with the production of syngas from natural gas (paragraph 6, lines 1-5). Prasad et al. teaches preformers used in conjunction with autothermal and conventional steam reformers to eliminate solid carbon formation which corresponds to a gasification zone in the second reactor to produce a solid carbon-depleted syngas product (paragraph 6, lines 29-31).
8. Regarding claims 13 and 14, Prasad et al. teaches the autothermal device consists of a combustion section (paragraph 10, lines 19-20).
9. Regarding claim 15, Prasad et al. teaches carbon dioxide enters with the oxygen stream which is from an external source (paragraph 22, lines 22-31).
10. Regarding claim 21, Prasad et al. teaches synthesis of methanol, DMA and Fischer-Tropsch liquids from syngas (paragraph 18, lines 39-40).

### ***Conclusion***

Any inquiry concerning this communication or earlier communications from the examiner should be directed to GUINEVER S. GREGORIO whose telephone number is (571)270-5827. The examiner can normally be reached on Monday-Thursday, 10:30-5:00 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Jennifer McNeil can be reached on 571-272-1540. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

gsg

/Jennifer McNeil/  
Supervisory Patent Examiner, Art Unit 4162